

# Will Airpower, Specifically Helicopters, Replace Tanks in 2010?

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"Flying tanks" have long been objects of speculation.<sup>1</sup> Some U.S. Department of Defense officials are questioning if, by 2010, joint force commanders should replace conventional tanks by employing "sophisticated attack and supporting helicopters"<sup>2</sup> to dominate force, time, and space. The potential outcome could be that joint force commanders, by employing these helicopters decisively, would cause tanks to become obsolete memories.

Are tanks going to be memories in 2010? This study proposes that yes, tanks may be memories in 2010, but in the form of bad memories to an enemy who confronts them.

Helicopters will not replace tanks in 2010. Tanks are not only compatible, but also unique, integral parts of the dominant maneuver vision as outlined in *Joint Vision 2010*. Instead of attempting to employ helicopters as "flying tanks," Joint force commanders should use helicopters as airpower assets, thus allowing them to operate in their full multidimensional perspective.

## Airpower and Landpower Doctrine

Airpower proponents predominately advocate that war has been fundamentally transformed by the advent of the airplane.<sup>3</sup> Air Force Doctrine Document 1 states that given the right circumstances, airpower can dominate the entire range of military operations in the air, on the land, on the sea, and in space.<sup>4</sup> Although this information is more far-reaching than the helicopter-tank issue, it is important to explore because helicopters, regardless of service component, are forms of airpower.

Airpower literature, overwhelmingly dominated by U.S. Air Force fixed-wing professionals, does not frequently espouse the helicopter. In addition, Army helicopters are normally not included in the air apportionment process or air task-

ing orders.<sup>5</sup> Helicopters, however, are ideally suited for rapid reaction in close, deep, or rear operations.<sup>6</sup> Despite the Army's reluctance to lose control of one of its most important maneuver assets to the Joint Force Air Component Commander (JFACC),<sup>7</sup> helicopters are capable of joining fixed-wing counterparts as airpower assets.

Landpower proponents do not disagree that airpower is important. They are more concerned, however, with sustained presence on the ground. The U.S. Army publishes, "U.S. land forces provide the most visible, sustained foreign presence on the ground, 24 hours a day, person-to-person, cooperating, sharing risks, and representing America."<sup>8</sup> In addition, in his article, "The Future of Armored Warfare," U.S. Army Lieutenant Colonel Ralph Peters argues, "The...dynamics of battle will demand grounded systems for many years to come."<sup>9</sup> Lastly, the U.S. Army and Air Force have developed "flyaway packages" tailored to airlift significant combat power to a theater within a short time. For example, one package consists of 14 M1A1 tanks, 15 Bradley Fighting Vehicles, and 335 soldiers, all ready to move within 48 hours of notification.<sup>10</sup> While the specifics on these packages are not significant, these examples illustrate the commitment the U.S. Army has on quickly placing people and heavy equipment on the ground.

Are helicopters simply support tools for tactical occupational forces, or can they be used as significant airpower assets at the tactical, operational, and strategic levels of war? The literature varies. For example, in the article, "American Armor in the Ground War Against Iraq," a firsthand account of armor operations during the 1991 Gulf War, Gregory Smith does not mention airpower or attack helicopters,<sup>11</sup> despite the fact they supported the armor advance.<sup>12</sup> Perhaps Smith regards their role as support for the offensive

forces, similar to the also unmentioned, but equally necessary logistic assets. Further research, however, indicates helicopters have built strong reputations as airpower assets. U.S. Army AH-64 Apache helicopters disabled Iraq's early warning radar during the opening moments of the 1991 Gulf War, allowing coalition airplanes to pour into Iraq undetected.<sup>13</sup> Both airpower and landpower literature supports having helicopters, but confusion exists on whether Joint Force commanders should replace tanks with them, or employ them as airpower assets.

Unfortunately, *Joint Vision 2010* does not clear up this confusion. For example, it states that by 2010, there should be less need to mass forces physically. Later, however, it notes there will still be a need for "boots on the ground" in many operations.<sup>14</sup> With the importance the U.S. Army gives to moving large amounts of armor into theaters, "boots on the ground" logically includes accompanying "treads on the ground."

Officials assigned to the Future Concepts Division of the Joint Warfighting Center, who write supporting concepts for *Joint Vision 2010*, are searching for clarification on this issue. They are concerned tanks may not be consistent with the concept of dominant maneuver as found in *Joint Vision 2010*. Dominant maneuver calls for "decisive speed and tempo" to apply overwhelming force to enemy centers of gravity. They are questioning if the land force of the future should rely on advanced, heavily armed helicopters to replace the relatively slow tank to fulfill the concept of dominant maneuver. An official from this organization writes:

*"Transporting tanks to a contingency takes a lot of time, and once there, they don't move very quickly. It seems that specially equipped helicopters, flown by experienced crews, could accomplish this mission. Using information superiority,*

*sophisticated helicopters armed with advanced weapons may be the attack forces of the future. Supporting helicopters could have infantry inside to land after an attack and do a quick “mop up” and then withdraw. Other helicopter forces could (or would) attack the enemy as vulnerabilities arise.”<sup>15</sup>*

This study makes the assumption that these “sophisticated helicopters armed with advanced weapons” are current helicopter airframes, and not limited to just U.S. Army attack helicopters. These helicopters, referred to as “flying tanks,” could be AH-64 Apaches, enhanced H-60 Black Hawks, or even specially armed CH-47 Chinooks. Helicopter design and type is less important to the joint force commander than techniques of employing these assets at the operational and strategic levels of war.

## The Geostrategic Environment

To understand the synergistic relationship between airpower, helicopters, and armor, one must first understand the geostrategic environment land forces of the future will operate in. During the Cold War, the U.S. Army was relatively certain what the threat was and from where it would come. Had the Soviets invaded Western Europe in 1989, the U.S. Army, consisting of 800,000 troops armed with thousands of tanks and helicopters, would have countered them.<sup>16</sup> This massive force, coupled with strong sister-service partners and formidable allies, effectively served as a deterrent.

In addition, the disintegration of the Soviet Union decreased the threat that limited conflicts around the globe could ignite a world war between superpowers. Unfortunately, the end of the Cold War also resulted in a new and expensive security challenge. Rogue nations, now unrestrained by a coercive superpower, tend to be more willing to use force within and across borders.

Between 1950 and 1989, the U.S. Army participated in 10 major deployments, but from 1990 to 1996, the U.S. Army deployed 25 times.<sup>17</sup> Most of these commitments called for soldiers to be on the ground, directly interfacing with the civilians and/or military involved in the crisis.

The full spectrum of Army capabilities may be required to prosecute diverse missions, ranging from disaster relief, through military operations other than war, to perhaps global war within the next decade.



— USAF Photo

Some of these missions will be best suited for airpower and helicopters, while tanks may best accomplish others. Most should be accomplished by a synergistic combination of the two, based on their capabilities and limitations. As the characteristics of helicopters and tanks are explored, the following recurrent theme occurs: *helicopters cannot in some cases, and should not in others, replace tanks.*

## Keep Tanks

Tanks do not normally operate directly at the operational and strategic levels of war, however, they are an indirect means to that end. Joint force commanders can exploit the tank’s capabilities, many of them not shared with helicopters.

First, tanks are the backbone of ground forces, and ground forces hold ground. Tanks, in mass, can demolish pockets of enemy resistance as they move forward. Many experts feel that airpower, unlike troops and tanks, cannot hold ground.<sup>18</sup>

History documents that control of the land often requires seizing it from opposing ground forces. For example, the October 1993 Battle of Mogadishu was fought under conditions that “begged for armor.”<sup>19</sup> The commander, based on operational security concerns, had earlier requested U.S. armor capabilities, but instead, armed helicopters and AC-130 gunships were used, with disastrous results.<sup>20</sup>

Without armor, U.S. forces had no way to rescue the survivors of this battle, and had to organize an ad hoc extraction force using Malaysian and Pakistani tanks.<sup>21</sup>

Many examples of helicopters failing to control the ground occurred during the Vietnam War. The “flying tank” concept

is similar to the “search and destroy” tactics employed by Army Aviation in Southeast Asia. Airmobility allowed the swift relocation of forces by leapfrogging them over obstacles on the ground.<sup>22</sup> The problem with this, however, was that once the helicopters left, the Vietcong would reemerge, move back into the villages, and regroup unopposed. Army Colonel Delbert Bristol, a Vietnam veteran, said in an interview, “*I still think that the Army exists to seize and hold terrain. To a certain degree you have to stay on the terrain in order to do that, and I think to that degree we may have erred a little bit in our conduct of the Vietnam War. More than a little bit.*”<sup>23</sup>

Normally, helicopters do not dominate the land or hold ground by flying overhead or firing weapons. Ground forces, supported by armor, are much more suited to these tasks. Helicopters could not replace ground forces and tanks in Vietnam or Somalia. They will not replace tanks in 2010.

Second, tanks are very powerful symbols and useful instruments of war and diplomacy, throughout the spectrum of warfare. Many feel it was the thousands of allied tanks rolling forward that made Saddam Hussein abandon Kuwait in 1991, not the helicopters flying around.<sup>24</sup> Airpower probably killed more Iraqi troops, but the dominant images of the Gulf War were tanks rolling into Kuwait City amid cheering, flag waving, Kuwaiti citizens. On the lower end of the scale, helicopters flying over rioting mobs during the 1992 Rodney King crisis did not effectively control crowds. Forces on the ground, backed by armor units and supported by helicopters, stopped rioters in Las Vegas, Nevada, from encroaching into crowded tourist areas.<sup>25</sup> Although this particular example is a domestic and

tactical police issue, it provides a superb example of how leadership effectively employed powerful symbols to control behavior and hold ground. Tanks have historically carried political messages throughout the levels of war.

A third capability of tanks, unlike helicopters, is their ability to operate in bad weather. High winds, severe turbulence, extremely low clouds, poor visibility, and freezing rain may slow down tanks. These conditions, however, may render hundreds of helicopters throughout the theater completely ineffective. For example, the U.S. Navy prohibits all UH-1N helicopters from flying during any icing conditions.<sup>26</sup> Since icing can occur throughout an entire theater, this common winter event would be significant, since all "flying tanks" with this limitation would be unusable. Bad weather may bog down tanks, but tanks are still less susceptible to adverse weather than helicopters.

A fourth tank capability is that of the crew. Tank operators are less expensive to train, easier to replace, and not as endurance limited as pilots. An after-action report, published after a recent division advanced warfighting experiment, highlighted this endurance issue. In this report, a Cavalry officer writes, "...need more crews than aircraft. Endurance of the airframe was greater than the crew endurance."<sup>27</sup> This is in contrast to the Smith article, where he describes a continuous armor advancement through Iraq over several days, stating, "*There was to be no rest for the battalion.*"<sup>28</sup>

Operational airpower artists understand that airpower cannot be sustained in this way, and must be scheduled properly to ensure continuous operations. Helicopters, limited by both equipment and crew, cannot operate like tanks nor could they have replaced them in the armor assault of Iraq.

## Replace Tanks?

Helicopters are oppressive weapons. They can get into the fight quickly, and once there, accomplish a myriad of different missions. Perhaps it is these superb capabilities that, unfortunately, gave birth to the idea of "flying tanks." Critics of tanks could counter-argue many of the previous points, or even create new arguments for replacing tanks with helicopters.

First of all, one could argue that it is simpler and quicker to get helicopters into a theater than tanks. For example, a C-5 transport aircraft can move one M1

tank,<sup>29</sup> or four H-60 helicopters.<sup>30</sup> In addition, many helicopters can self-deploy. Enhanced by air-refueling capabilities, many helicopters can fly to a fight thousands of miles away, then be ready to fly combat missions upon arrival. Tanks normally move via ship, and are not suited to administratively traverse great distances to fight.

Although these facts are true, two issues negate this argument. First, if helicopters will be ineffective in a crisis that requires armor, such as the battle of Mogadishu, it is not logical for a joint force commander to use them just because they arrive first. He should select the proper tools that do the job effectively. As for the speed of arrival issue, "flyaway packages," coupled with numerous pre-positioned ships filled with equipment, change the way the U.S. Army views deployments.<sup>31</sup> If a joint force commander needs tanks, the U.S. logistic system is set up to get them to him in a hurry.

A second argument could be that helicopters are more mobile than tanks. Helicopters can circumvent threats, fly over terrain, and easily transit between ships and the shore. Unlike tanks, helicopters can exploit elevation. Unencumbered by terrain, helicopters can quickly move to different locations within the theater. Tanks are much more geographically challenged than helicopters. Rough terrain, swamps, rivers, and other obstacles, easily circumvented by helicopters, must be negotiated by tanks. Since tanks move slower than helicopters, critics could argue they are not consistent with the concept of dominant maneuver, as found in *Joint Vision 2010*.

There is no argument that helicopters are more mobile than tanks. However, even if traversing ground is difficult, it is still necessary. U.S. Army General Robert R. Williams, on discussing air-mobility operations in Vietnam, points out the difficulty of land warfare. He writes, "*You have to fight it down in the muck and the mud at night, and on a day-to-day basis. That's not the American way and you are not going to get the American soldier to fight that way.*"<sup>32</sup>

Although General George Patton understood the difficulties of land warfare, he also realized the importance of holding ground. His resourcefulness, leadership style, and tenacity made the seemingly impossible happen. In the book *Nineteen Stars*, Edgar Puryear writes. "*(General Patton) did everything possible to get his Army to drive, drive, drive. A town that could not be captured swiftly was bypassed, to be strangled to death while his*

*troops pressed after the quarry, like hounds baying for a kill.*"<sup>33</sup>

In both these historical examples, commanders had very mobile airpower assets, but that did not equate to control of the ground. Today, the United States has firm control of the air over Bosnia and Iraq, however, that control is not wholly relevant to actions on the ground.<sup>34</sup> In 2010, helicopters may be moving quickly over contested settlements or terrain, however "boots and treads" will be fighting and holding ground below them.

As for the dominant maneuver issue, operational artists must understand decisive speed and tempo do not equate to miles per hour. Tank commanders must coordinate on the proper speed and tempo to achieve the decisiveness sought by joint force commanders. For example, open desert warfare may require a swift armor assault, while combat in an urban setting may call for a relatively slow, methodical armor advance. Helicopters may move faster than tanks; however, if flying over the enemy is not effective, then it is not decisive, nor does it affect the tempo, and it dominates nothing.

A third argument "flying tank" proponents could make is that tank warfare is synonymous with bloody attrition warfare while airpower is not. For example, helicopters began attacking targets in Iraq and Kuwait on 17 January 1991, while coalition land forces did not cross the Saudi-Iraq border until 24 February.<sup>35</sup> Perhaps this delay was due to the vulnerability of ground forces, the likelihood of attrition warfare, and the theory that U.S. attrition rates would drain the will of the American people. Saddam Hussein felt this way. He told a U.S. Ambassador on 25 July 1990, "*Yours is a society which cannot accept 10,000 dead in one battle.*"<sup>36</sup>

This argument makes three assumptions: tank warfare is synonymous with attrition warfare; the goal of war is to avoid bloodshed; and "flying tanks" will accomplish that goal. If these assumptions were true, Joint force commanders would undoubtedly replace tanks with helicopters.

Reality, however, is not that simple. In *On War*, Clausewitz described the reality of warfare, "*Kind-hearted people might of course think there was some ingenious way to disarm or defeat an enemy without too much bloodshed, and might imagine this is the true goal of the art of war. Pleasant as it sounds, it is a fallacy.*"<sup>37</sup>

First of all, land warfare and tanks do not hold the monopoly on attrition warfare. For example, one could argue strategic bombing in World War II degenerated into attrition warfare, as did helicopter operations in Vietnam. Clausewitz negates the second assumption in this argument by pointing out that avoiding bloodshed is not the goal of war. Lastly, since military objectives make up the goals of war, helicopters are suited well for some, while tanks are suited better for others. This argument, supported by faulty assumptions, does not support replacing tanks with helicopters.

A fourth argument could assert that since helicopters are more flexible than tanks, helicopters should replace them. For example, some helicopters can deliver ordnance behind enemy lines one day, then provide close air support to friendly forces the next. MH-53J *Pave Low* helicopters led AH-64 Apache attack helicopters to targets, flew rescue missions, and searched for mobile Scud launchers.<sup>38</sup> Not all “flying tanks” could do all these missions, but when compared to tanks, helicopters offer many more options.

Taking this argument one step further, one could comment that because of the helicopter’s speed and flexibility, Joint force commanders do not have to limit employing them at just the tactical level of war. Since it is argued that airpower is inherently a strategic force,<sup>39</sup> and helicopters are forms of airpower, many helicopters can conduct operations that have operational or strategic effects. For example, helicopters could conduct preparations for a major operation, normally classified as operational fires,<sup>40</sup> in the form of early destruction of enemy airfields and aircraft on the ground. Unlike helicopters, tanks are not suited to instantly operate at the operational and strategic levels of war. Tanks are normally in tactical units, designed to fight through enemy forces in an effort to position themselves for decisive, strategic operations.<sup>41</sup> In this example, helicopters are more capable than tanks.

If “flying tanks” could do all these missions throughout the tactical, operational, and strategic levels of war, in addition to effectively replacing tanks, Joint force commanders would surely select this economically advantageous option. Reality, however, negates this “helicopters can do it all” argument.

The first part of this argument assumes helicopters can effectively replace the mission of tanks, an issue previously

negated. The second part of this argument asserts that “flying tanks” could also be effectively employed as airpower assets. To understand why they cannot requires a discussion on both helicopter aerodynamics and command and control.

First, high performance helicopters, defined by superior maneuverability and agility, fly faster, turn sharper, ascend and descend quicker, and evade threats better than heavier helicopters.<sup>42</sup> In addition, British tank expert R.M. Ogorkiewicz, argues for the development of thicker tank armor to defeat new anti-tank threats, resulting in a weight of approximately four metric tons per square meter.<sup>43</sup> This is too much weight for a helicopter. These details may be immaterial to joint force commanders, but the message they illustrate is critical. Put simply, high performance helicopters, equipped with the armor and modifications to make them “flying tanks,” are no longer high

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performance helicopters. In this configuration, these sluggish helicopters could not be exploited to their full potential as airpower assets. “Flying tanks” would lose their unique ability to strike operational and strategic targets in threatened areas. Lieutenant Colonel Peters warns: “A very real danger...is asking any system to do too many things, resulting in a system that does nothing especially well.”<sup>44</sup>

The second issue that corrupts this “do it all” argument is command and control. “Flying tanks” would most likely be owned or parceled out to armor commanders, thus unavailable for full exploitation as airpower assets. Joint force commanders should use helicopters as forms of airpower, versus tethering them to armor units as “flying tanks.”

The importance of unity of command and unity of effort, coupled with the realization that helicopters will not reach their full potential unless allowed to operate in the full multidimensional perspective, are reasons why.

## Conclusion

Tanks will remain formidable weapons until at least 2010. Tanks are consistent with dominant maneuver, specifically decisive speed and tempo, as directed by *Joint Vision 2010*. Their symbolic presence, ability to demolish enemy resistance, and hold ground effectively, makes them decisive. Miles-per-hour does not equate to decisiveness.

Joint force commanders should not use helicopters to replace tanks. Tanks provide “boots on the ground” presence throughout the spectrum of warfare. To best support ground forces, agile and maneuverable helicopters should be used in synchronization with other airpower assets to provide close air support, air interdiction, or any other missions more suitable to their capabilities. It would be dangerous to parcel out helicopters to armor commanders, thus making them unavailable for exploitation as powerful airpower assets.

## Recommendations

First, this research supports the recommendation that joint force commanders should not replace tanks with helicopters. Helicopters can supplement, augment, and support tanks; however, they are not able to replace them. The geostrategic environment of 2010 will call for soldiers to be on the ground, directly interfacing with people involved in the crisis. Unlike helicopters, tanks will provide a “boots on the ground” presence throughout the spectrum of warfare. As U.S. Air Force Colonel Richard Szafranski highlights in his article “Twelve Principles Emerging From Ten Propositions,” “*Airpower can blow a door off of its hinges, but, unlike a simple soldier or marine, airpower cannot see what is behind the door.*”<sup>45</sup>

Secondly, since tanks are necessary, armor units must receive the support they require to get into the fight. For example, staffs must work out the logistics of moving ample numbers of tanks into the theater, then establish and protect healthy logistics trails. “Flyaway packages” and prepositioned ships are invalidating the paradigm that it takes too long to get tanks into a theater. Joint force commanders must understand that if they need tanks, they should request them, and then let the logistics system go to work.

Third, operational artists must understand that decisive speed and tempo is not defined in miles per hour, but instead as the appropriate speed and tempo required to be decisive. The concept of “flying

tanks" is similar to what the military used in Vietnam. In Vietnam, helicopters had greater speed than ground forces, but this speed did not affect the tempo or the decisiveness of those operations. This is a complex concept, and one that should be articulated, published, then disseminated by the Joint Warfighting Center in a future *Joint Vision 2010* supporting concept publication.

Will tanks be memories in 2010? Perhaps a potential adversary will understand and remember these powerful symbols can be deployed within hours anywhere in the world. Perhaps he will ascertain they will dominate his land, despite the weather or terrain. If this rogue leader understands tanks will be used against him, in combination with fixed-wing and helicopter assets, perhaps he will be dissuaded from even initiating hostilities. If deterrence fails, Joint force commanders can unleash an overwhelming force of tanks upon this enemy. Following the conflict, tanks will indeed become fresh and impregnable memories in the minds of the international community.

## Notes

<sup>1</sup>Ralph Peters, "The Future of Armored Warfare," *Parameters*, U.S. Army War College Quarterly, Autumn 1997, p. 53.

<sup>2</sup>Ron Mayer, "Research Paper," Transmitted 3 December 1997. Personal e-mail received 3 December 1997.

<sup>3</sup>The School of Advanced Airpower Studies, Philip S. Meilinger, ed., *The Paths of Heaven: The Evolution of Airpower Theory* (Air University Press, Maxwell Air Force Base, Ala., 1997), xi.

<sup>4</sup>Department of the U.S. Air Force, *Air Force Basic Doctrine* (Air Force Doctrine Document 1) (Washington D.C.: September, 1997), 73.

<sup>5</sup>R. C. Kowalczyk, "Revisiting the Army and Close Air Support: Disjointed Doctrine or Difference in Semantics," (Unpublished Research Paper, U.S. Naval War College, Newport, R.I.: 1997), 12.

<sup>6</sup>Department of the U.S. Army, *Operations* (Field Manual 100-5) (Washington D.C.: 14 June 1993), 2-23.

<sup>7</sup>Kowalczyk, 12.

<sup>8</sup>"The Geostrategic Environment and its Implications for Land Forces," *Army Vision 2010*, No date, [www.army.mil/2010/geostrategic\\_environment.htm](http://www.army.mil/2010/geostrategic_environment.htm), retrieved 19 January 1998.

<sup>9</sup>Peters, 53.

<sup>10</sup>Bruce K. Scott and Robert M. Toguchi, "Strategic Dominant Maneuver," *Army*, September 1997, 23.

<sup>11</sup>Gregory M. Smith, "American Armor in the Ground War Against Iraq," *Strategy & Tactics*, May/June 1997, 43-46.

<sup>12</sup>Stephen Biddle, "Victory Misunderstood: What the Gulf War tells us about the Future of Conflict," *International Security*, 21:2, Fall 1996, 483.

<sup>13</sup>United States Special Operations Command History and Research Office, *United States Special Operation Command 10th Anniversary History* (MacDill Air Force Base, Fla., 16 April 1997), 38.

<sup>14</sup>Joint Chiefs of Staff, *Joint Vision 2010* (Washington D.C.), 18.

<sup>15</sup>Mayer.

<sup>16</sup>"Decisive Mounted Maneuver XXI, Strategic Plan FY 1998, Part IV, Strategic Environment," *The Future of Armor*, No date, <<http://147.238.100.101/center/stratplan/part4.htm>> retrieved 19 January 1998.

<sup>17</sup>"The Geostrategic Environment and its Implications for Land Forces," retrieved 20 January 1998.

<sup>18</sup>"Force XXI Joint Venture," *Armed Forces Journal International*, December 1997, 6.

<sup>19</sup>Peters, 53.

<sup>20</sup>Kenneth Allard, *Somalia Operations, Lessons Learned* (National Defense University Press, Fort McNair, Washington, D.C., January 1995), 58.

<sup>21</sup>Ibid.

<sup>22</sup>Donald J. Mrozek, *Air Power and the Ground War in Vietnam* (Air University Press, Maxwell Air Force Base, Ala., 1997), 91.

<sup>23</sup>U.S. Army Colonel Delbert Bristol, quoted by Donald J. Mrozek, *Air Power and the Ground War in Vietnam* (Air University Press, Maxwell Air Force Base, Ala., 1997), 91.

<sup>24</sup>U.S. Army Colonel (Select) Ed Sullivan, Professor, U.S. Naval War College, Newport, Rhode Island, interview by author, 2 December 1997, in his office, tape recording.

<sup>25</sup>U.S. Air Force Major West Kasper, helicopter pilot, Nellis Air Force Base, Nev., telephone interview with author, 31 January 1998.

<sup>26</sup>Department of the U.S. Navy, *Naval Air Training and Operating Procedures Standardization Flight Manual-UH-1N Aircraft* (NAVAIR 01-110HCE-1) (Washington D.C.: 1 November, 1992), 15-3, paragraph 15.2.2.

<sup>27</sup>Captain Philip Mayberry's 26 November 1997 after-action report of a division advanced warfighting experiment, as provided by Major Steven Short, Transmitted 4 December 1997. Personal e-mail received 4 December 1997.

<sup>28</sup>Smith, 45.

<sup>29</sup>U.S. Air Force Major Richard Oddo, C-5 Instructor Pilot, telephone interview with author, 18 January 1998.

<sup>30</sup>Department of the US Air Force, Air Force Special Operations Command (AFSOC), 18th Flight Test Squadron, *MH-60G Tactical Employment Manual* (AFSOC Manual 11-1, Vol. 10), (Hurlburt Field, Fla., 31 August 1997), 17.

<sup>31</sup>Scott and Toguchi, 23.

<sup>32</sup>Mrozek, 91.

<sup>33</sup>Edgar F. Puryear, Jr., *Nineteen Stars, A Study in Military Character and Leadership* (Novato, Calif.: Presidio Press, 1988), 275.

<sup>34</sup>Richard Szafranski, "Twelve Principles Emerging From Ten Propositions," *Airpower Journal*, Vol. X, No. 1, Spring 1996, 74.

<sup>35</sup>Smith, 44.

<sup>36</sup>Norman Cigar, "Iraq's Strategic Mindset and the Gulf War: Blueprint for Defeat," *The Journal of Strategic Studies*, Volume 15, number 1, March 1992, 5.

<sup>37</sup>Carl Von Clausewitz, *On War*, 1984 ed. (New York: Alfred A. Knopf, Inc. 1993), 75.

<sup>38</sup>*United States Special Operation Command 10th Anniversary History*, 38.

<sup>39</sup>Phillip S. Meilinger, *10 Propositions Regarding Airpower* (Air Force History and Museums Program 1995), 8-13.

<sup>40</sup>Chet Hems, *Operational Functions* (U.S. Naval War College Reading 4103A) (US Naval War College, Joint Military Operations Department, Newport, R.I., No date), 13.

<sup>41</sup>U.S. Army Major Vincent D. Bryant, "U.S. Army Doctrine and Capabilities," Seminar Presentation, U.S. Naval War College, Newport, R.I.: 18 December 1997.

<sup>42</sup>U.S. Air Force, Air Combat Command, 57th Test Group, *Tactical Employment: HH-60* (Multi-Command Manual 3-1, Volume 24) (Nellis Air Force Base, Nev., 15 April 1996), Attachment 1, pg. A152.

<sup>43</sup>Rolf Himes, "The Tank Moves into the Next Millennium," *Soldat und Technik*, May 1992, 6. Translated from German and published by the U.S. Army Foreign Science and Technology Center, Charlottesville, Va., October 1992, 6.

<sup>44</sup>Peters, 53.

<sup>45</sup>Szafranski, 76.

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